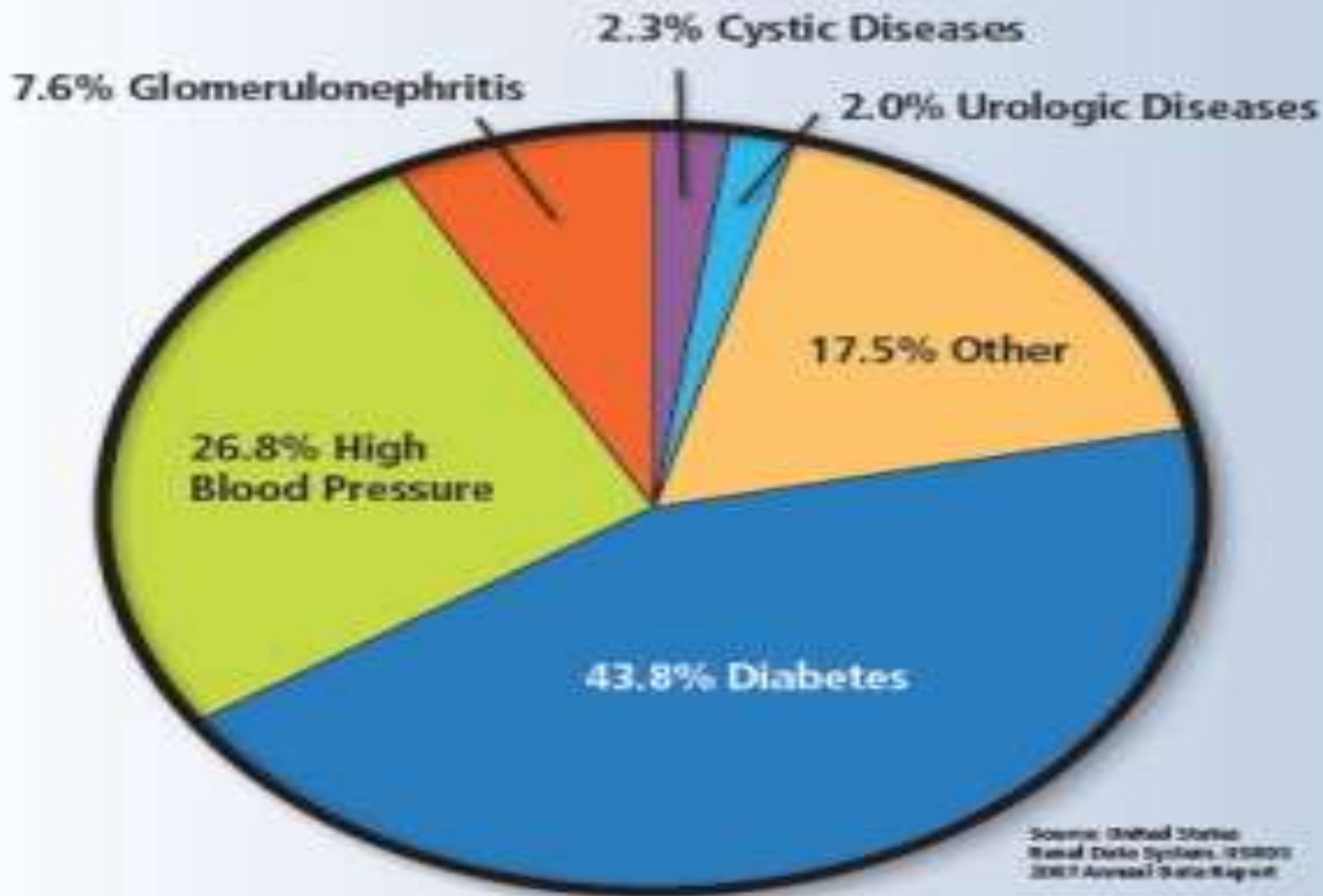




# **Non diabetic kidney diseases** in **diabetic**

**Ghada El-Kanishy**  
**Prof. of Internal Medicine**  
**Mansoura Faculty of Medicine**

## PRIMARY CAUSES OF KIDNEY FAILURE (2005)



# Diabetic nephropathy

## Complications of Type 2 Diabetes

### Microvascular Complications

#### **Diabetic Retinopathy**

Leading cause of blindness in working-age adults



#### **Diabetic Nephropathy**

Leading cause of end-stage renal disease



#### **Diabetic Neuropathy**

Leading cause of nontraumatic lower extremity amputations



### Macrovascular Complications

#### **Stroke**

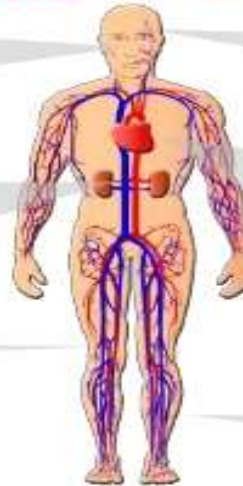
2- to 4-fold increase in cardiovascular mortality and stroke



#### **Heart Disease**



#### **Peripheral Vascular Disease**



Are diabetic patients  
immune against other  
kidney diseases?

## Table 2 : Causes of ESRD in patients with type 2 DM

---

1. Diabetic nephropathy

## Prevalence of nondiabetic renal disease in diabetic patients.

Pham TT<sup>1</sup>, Sim JJ, Kujubu DA, Liu IL, Kumar VA.

### + Author information

#### Abstract

**BACKGROUND:** Diabetic patients with type 2 diabetes mellitus and nondiabetic renal disease (NDRD) are often overlooked.

**METHODS:** A retrospective analysis of renal biopsies between January 1, 2000 and December 31, 2005.

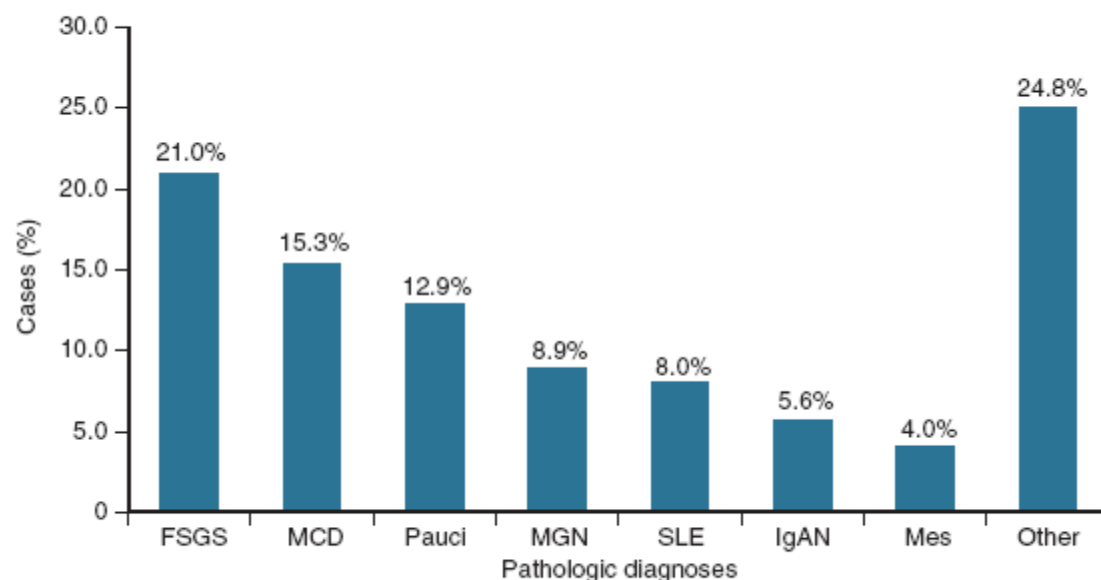
**RESULTS:** After excluding patients with diabetic glomerulonephritis (DGN), 58.1 +/- 1.2% of patients with NDRD had a pathologic diagnosis of DGN (CD). Patients with DGN had a higher prevalence of retinopathy. Focal segmental glomerulosclerosis (FSGS) was the most common pathologic diagnosis (21.0%) of all NDRD, followed by mesangiocapillary glomerulonephritis (MCGN) (15.3%), pauci-immune glomerulonephritis (12.9%), MGN (8.9%), SLE (8.0%), IgAN (5.6%), and Mes (4.0%).

**CONCLUSIONS:** The high prevalence of NDRD found in our population underscores the need for clinicians to consider renal biopsy in diabetic patients with an atypical clinical course, since additional disease-specific therapies may be helpful for this subset of the population.

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American Journal of  
**Nephrology**

#### Pathologic Diagnoses other than Diabetic Nephropathy



most patients with a prevalence of nondiabetic renal disease (NDRD) suggestive of NDRD.

diagnostic renal biopsy

age at the time of diagnosis (3.2%) with a concurrent NDRD. NDRD is associated with diabetic glomerulonephritis (DGN) and accounted for 21.0% of all NDRD.

**Table 1 : DN Vs NDRD in Type 2 DM : Literature Summary**

Authors	No. of Patients	NDRD	DN	References
Hung F et al. (2007)	52	20(38.5%)	32(61.5%)	12
Pham TT et al. (2007)	233	124(53.2%)	109(46.8%)	05
Zhou J et al. (2007)	110	54(46%)	60(54%)	15
Parving HH et al. (1992)	35	08(23%)	27(77%)	09
Olsen S et al. (1966)	33	04(12%)	29(88%)	33
Prakash J et al. (2001)	260	32(12.3%)	228(87.6%)	04
Prakash J et al. (2007)	23	10(43.7%)	13(56.3)	13
*Christensen PK et al. (2000)	51	07(13%)	35(69%)	30
Serra A et al. (2002)	35	06(17%)	29(83%)	19
*Gambara V et al. (1993)	52	16(30.8%)	19(36.5%)	16
**Kveder K et al. (2001)	76	37(49%)	17(22%)	31

*Zhou J, et al. Nephrol Dial Transplant 2008.*





Year : 2012 | Volume : 23 | Issue : 5 | Page : 1000-1007

## Non-diabetic renal disease in patients with type-2 diabetes mellitus

Sonia Yaqub, Waqar Kashif, Syed Ather Hussain

Section of Nephrology, Department of Medicine, Aga Khan University Hospital, Karachi, Pakistan

Histology	Group-I (n = 34) (Isolated NDRD) n (%)	Group-II (n = 11) (NDRD superimposed on underlying DN) n (%)
Acute interstitial nephritis	11 (32.3)	7 (63.6)
Diffuse proliferative glomerulonephritis (post-infectious)	7 (20.5)	-
Membranous nephropathy	4 (11.7)	-
Crescentic glomerulonephritis	4 (11.7)	-
Minimal change disease	2 (5.8)	-
Focal and segmental glomerulosclerosis	2 (5.8)	-
IgA nephropathy	2 (5.8)	-
Amyloidosis	1 (2.9)	-
Lupus nephritis	1 (2.9)	-
Membranoproliferative glomerulonephritis	-	1 (9)
End-stage renal disease	-	3 (27.2)

NDRD: non-diabetic renal disease, DN: diabetic nephropathy

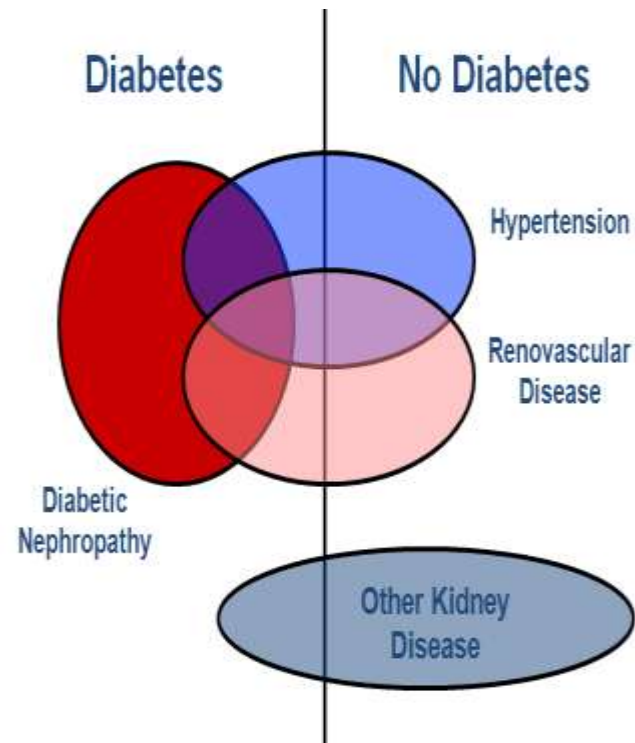


# Kidney Diseases in People with Diabetes

- **1. Isolated NDRD**

- **2. Pure DN**

- **3. NDRD & DN**



- In addition, there can be significant overlap

# Approach to Diabetic Patient with Impaired Renal Function

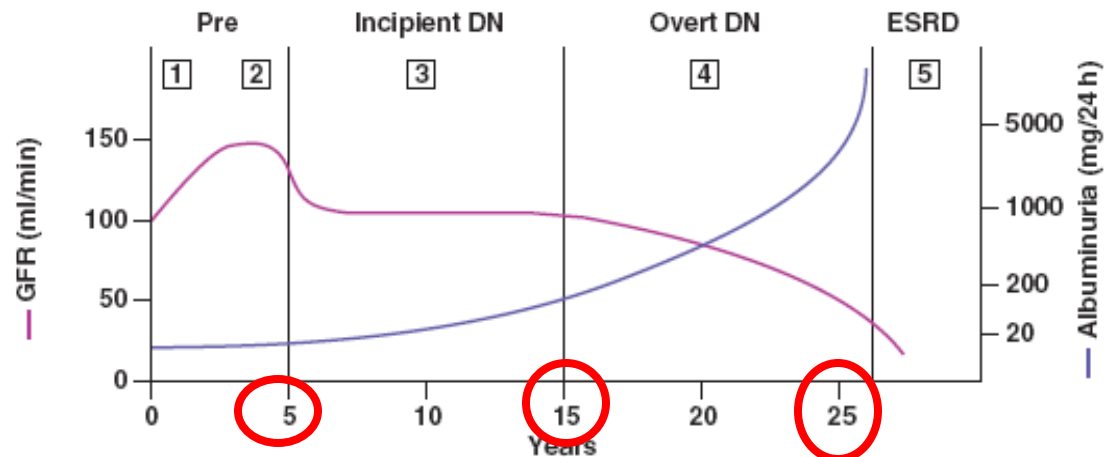
- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment
- Measurement of serum cr.& estimation of GFR
- Measurement of blood pressure
- Ophthalmologic examination
- Search for evidence of the typical extrarenal microvascular and macrovascular complications of diabetes.
- Signs or symptoms of other systemic disease

# Approach to Diabetic Patient with Impaired Renal Function

- Type & duration of diabetes
- Assess natural history of progression of DN

# Evolution of Diabetic Nephropathy

## Natural History of Type 1 Diabetic Nephropathy



Stage	Pre	Incipient	Overt
Functional	GFR ↑ (25%–50%)	Microalbuminuria, hypertension	Proteinuria, nephrotic syndrome, GFR ↓
Structural	Renal hypertrophy	Mesangial expansion, GBM thickening, arteriolar hyalinosis	Mesangial nodules (Kimmelstiel-Wilson lesions) Tubulointerstitial fibrosis

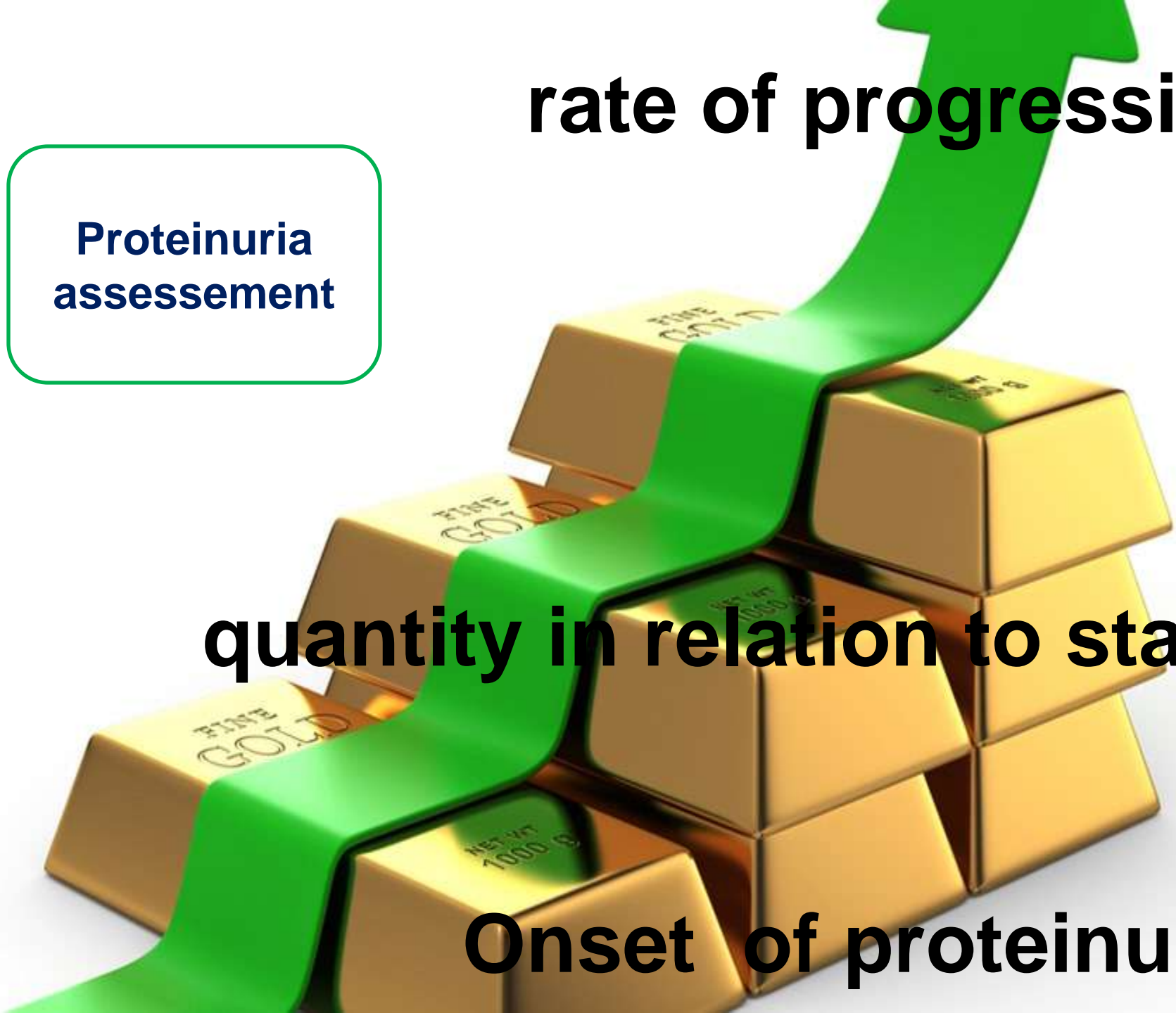
Mogensen CE. Diabetes (1997)

**rate of progression**

**Proteinuria  
assessment**

**quantity in relation to stage**

**Onset of proteinuria**



# When to suspect NDRD

duration of type 1  
diabetes has been less  
than 5 years





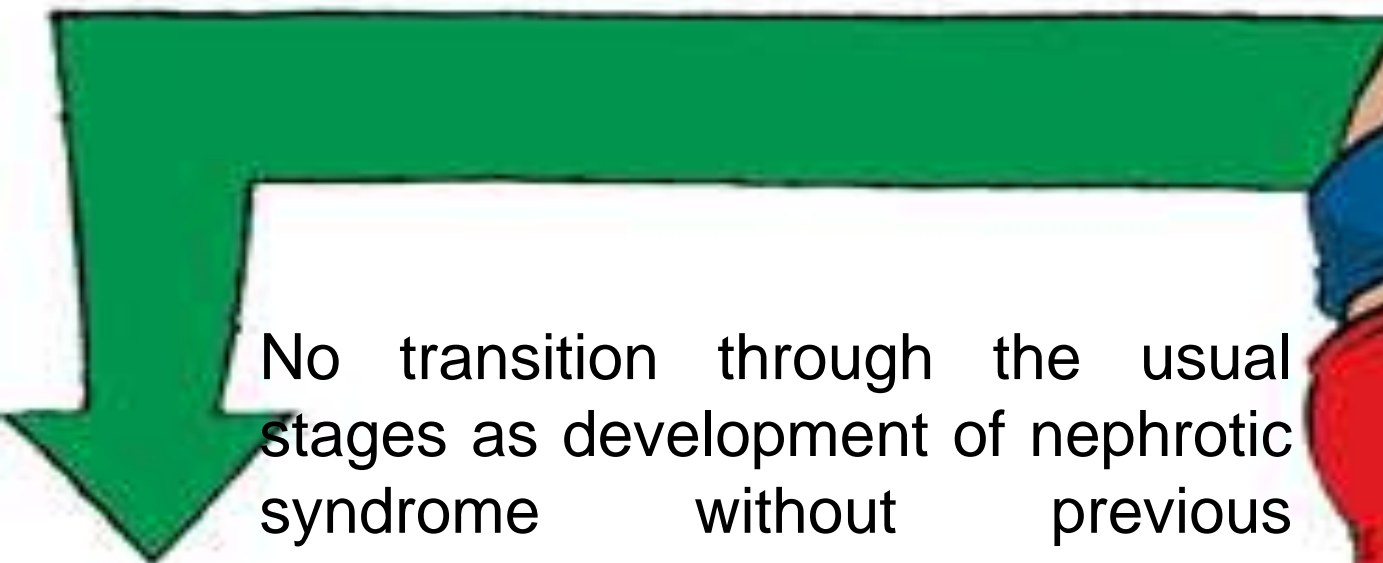
# When to suspect NDRD

onset of proteinuria



**Sudden &  
rapid**

# When to suspect NDRD



No transition through the usual stages as development of nephrotic syndrome without previous microalbuminuria

**Atypical evolution of stages of DN**



# Can a classical diabetic nephropathy occur in the absence of proteinuria?

J. Biomedical Science and Engineering, 2013, 6, 20-25

JBSE

<http://dx.doi.org/10.4236/jbise.2013.65A005> Published Online May 2013 (<http://www.scirp.org/journal/jbise/>)

## Absence of albuminuria in type 2 diabetics with classical diabetic nephropathy: Clinical pathological study<sup>\*</sup>

Pooja Budhiraja<sup>1,2</sup>, Bijin Thajudeen<sup>1,2</sup>, Mordecai Popovtzer<sup>1,2</sup>

<sup>1</sup>Department of Medicine, Southern Arizona Veterans Affairs Health Care System, Tucson, USA

<sup>2</sup>Department of Medicine, University of Arizona College of Medicine, Tucson, USA

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**Method:** We examined renal biopsies of subjects who underwent nephrectomy from 1999 to 2009 for renal cancer, had eGFR < 60 ml/min and no microalbuminuria or proteinuria. 10 diabetics were matched with 10 non diabetics for age, hypertension and baseline creatinine. **Results:** The diabetic subjects had advanced diabetic lesions even in absence of proteinuria. Tubules and tubular-interstitium was relatively well preserved. Diabetic glomerulosclerosis can occur in the absence of microalbuminuria. **Conclusions:** It

### **Conclusions:**

Diabetic glomerulosclerosis may develop before the proteinuria can be detected and *relying on albumin excretion as first sign for renal involvement may be **too late** in diagnosing and modifying the progression of the kidney disease.*



**Original Paper**

---

# **Renal Dysfunction in the Presence of Normoalbuminuria in Type 2 Diabetes: Results from the DEMAND Study**

Jamie P. Dwyer<sup>a</sup> Hans-Henrik Parving<sup>b, c</sup>

Lawrence G. Hunsicker<sup>d</sup> Moti Ravid<sup>e</sup> Giuseppe Remuzzi<sup>f</sup>

Julia B. Lewis<sup>a</sup> for the DEMAND Investigators

**Table 2.** CKD stage and level of albuminuria (A)

CKD	n	Normoalbuminuria	Microalbuminuria	Macroalbuminuria
Total	24,151 (100%)	51%	39%	10%
Stage 1	3,132 (13%)	56%	36%	8.4%
Stage 2	5,855 (24%)	56%	36%	8.5%
Stage 3	2,428 (10%)	41%	47%	12%
Stage 4	141 (0.6%)	26%	48%	26%
Stage 5	17 (0.07%)	29%	47%	24%
Unknown	12,578 (58%)	51%	39%	10%

CKD stage was classified according to MDRD and NKF criteria. Total includes even those patients in whom measures of kidney function were not obtained (categorized as Unknown). In a total of 11,573 patients, data to calculate kidney function were available.

## CONCLUSION:

A **large proportion** of diabetic patients with completely normal urinary albumin excretion or microalbuminuria presented with significant kidney dysfunction.



- Macroangiopathic lesions prevailing over microangiopathic may *reflect changes in treatment* that is being achieved in diabetic patients.
  - Treatment of HTN and/or nephropathy with RAS blocking drugs has been dramatically increasing.
  - Improved glycemic control
  - Reduced lipids levels, and blood pressure (BP) levels

NO  
significant  
proteinuria



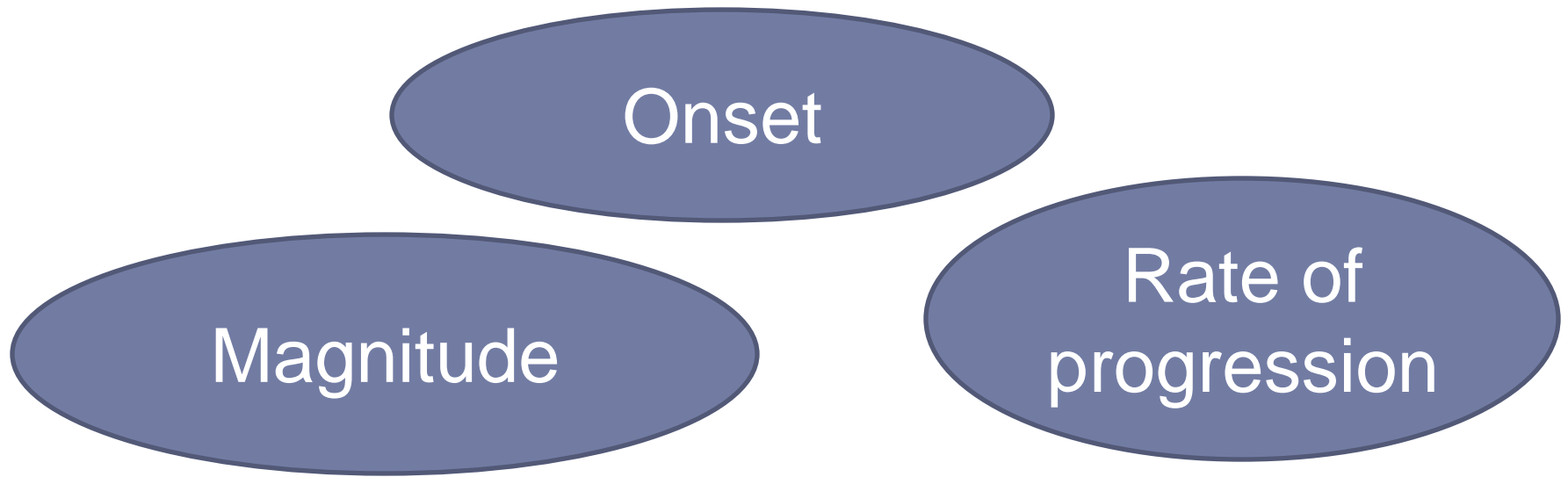
renal dysfunction

**IMPORTANT**



**renovascular disease  
must be excluded**

# Interpretation of proteinuria



**Exclusion of other  
confounding factors**

**The detection of urinary albumin is a specific indicator of DN only if confounding factors are excluded**

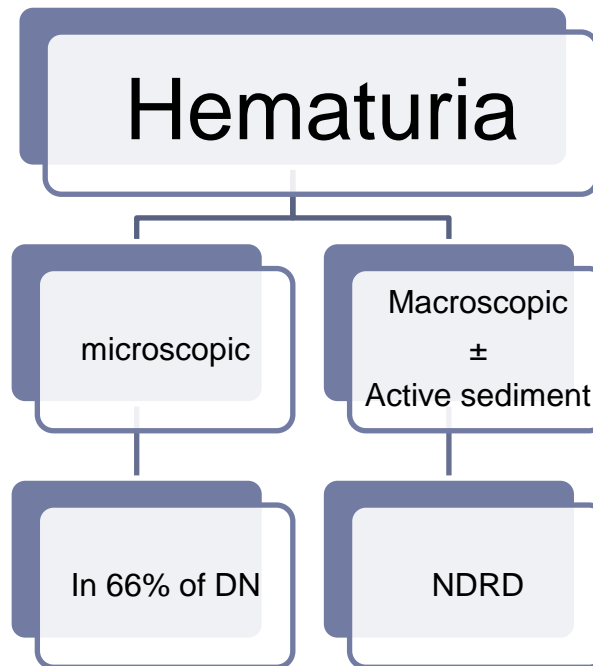
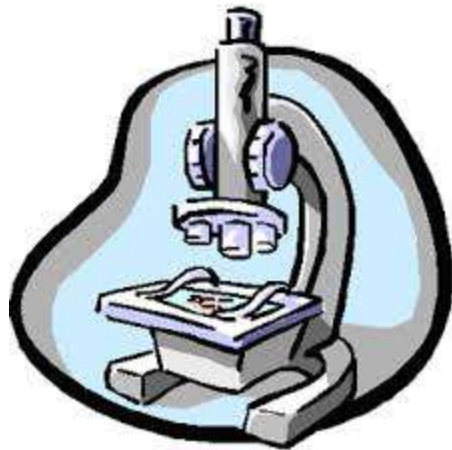
- Fever
- Physical exercise
- Urinary tract infection
- Nondiabetic renal disease
- Hematuria from other causes
- Heart failure
- Uncontrolled hypertension
- Uncontrolled hyperglycemia

# Approach to Diabetic Patient with Impaired Renal Function

- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment

# Examination of urine

- the sediment in DN typically unremarkable apart from some occasional erythrocytes



*Akimoto T, et al. Clin Nephrol. (1988)*



# Dysmorphic erythrocytes are superior to hematuria for indicating non-diabetic renal disease in type 2 diabetics

Zhe-yi Dong, Yuan-da Wang, Qiang Qiu, Kai H  
Xue-guang Zhang, Mo-yan Liu, Jia Kou, Xiang

Department of Nephrology, Chinese PLA General Hospital, Chinese  
Diseases, Beijing, China

## ABSTRACT


**Aims/Introduction:** There are sparse and limited studies on erythrocyte morphology in renal biopsy identifying nephropathic patients among type 2 diabetics. The present study sought to clarify the predictive value of dysmorphic erythrocytes in type 2 diabetics with non-diabetic renal disease and influences on hematuria.

**Materials and Methods:** We examined 198 patients with type 2 diabetes who underwent kidney biopsies between 2012 and 2013. Hematuria was defined as  $>3$  or  $>10$  red blood cells per high-power field (RBCs/hpf) in urine sediment. If  $>80\%$  of the erythrocytes were dysmorphic, glomerular hematuria was diagnosed. Clinical findings and predictive value of dysmorphic erythrocytes were compared between patients with hematuria ( $n = 19$ ) and those without ( $n = 61$ ). The potential risk factors for hematuria among diabetic nephropathy patients were also screened.

**Results:** There was a statistically significant difference between the diabetic nephropathy group and the non-diabetic renal disease group ( $6.6$  vs  $16.8\%$ ;  $P = 0.04$ ) when the demarcation point of hematuria was 10 RBCs/hpf. When the definition of hematuria was based on an examination of urinary erythrocyte morphology, a marked difference was seen ( $3.3$  vs  $24.8\%$ ;  $P < 0.001$ ). Glomerular hematuria showed high specificity and a positive predictive value (0.97 and 0.94, respectively) in non-diabetic renal disease. A multivariate analysis showed that nephrotic syndrome was significantly associated with hematuria (odds ratio 3.636;  $P = 0.034$ ).

**Conclusions:** Dysmorphic erythrocytes were superior to hematuria for indicating non-diabetic renal disease in type 2 diabetics. Nephrotic syndrome was an independent risk factor for hematuria.

Comparison of the incidence of hematuria in the diabetic nephropathy and non-diabetic renal disease groups

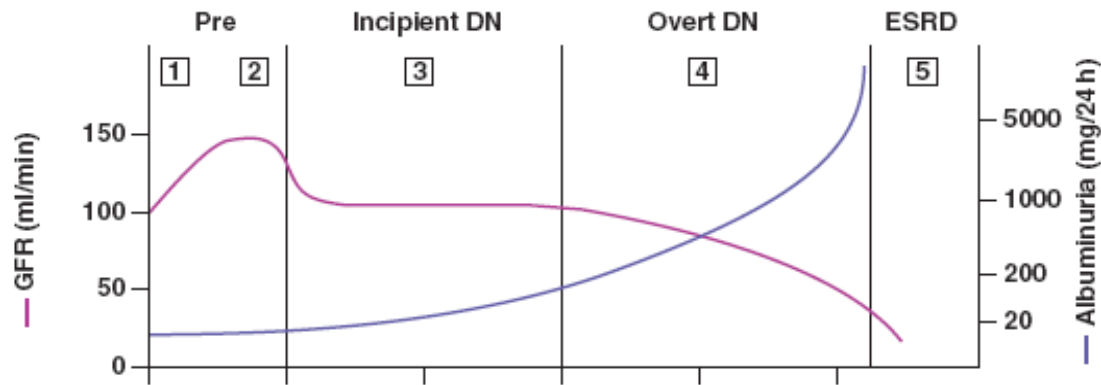
Definition of hematuria (RBCs/hpf)	DN group, presence (%)	NDRD group, presence (%)	<i>P</i> -value
>2	24 (39.3%)	64 (46.7%)	0.29
>3	19 (31.1%)	60 (43.8%)	0.77
>5	15 (24.6%)	42 (30.7%)	0.33
>7	10 (16.4%)	31 (22.6%)	0.27
>8	7 (11.5%)	27 (19.7%)	0.13
>10	4 (6.6%)	23 (16.8%)	0.04
>15	3 (4.9%)	15 (10.9%)	0.17
Glomerular hematuria			<0.001

# Approach to Diabetic Patient with Impaired Renal Function

- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment
- Measurement of serum cr.& estimation of GFR

# Measurement of serum creatinine concentration and estimation of GFR

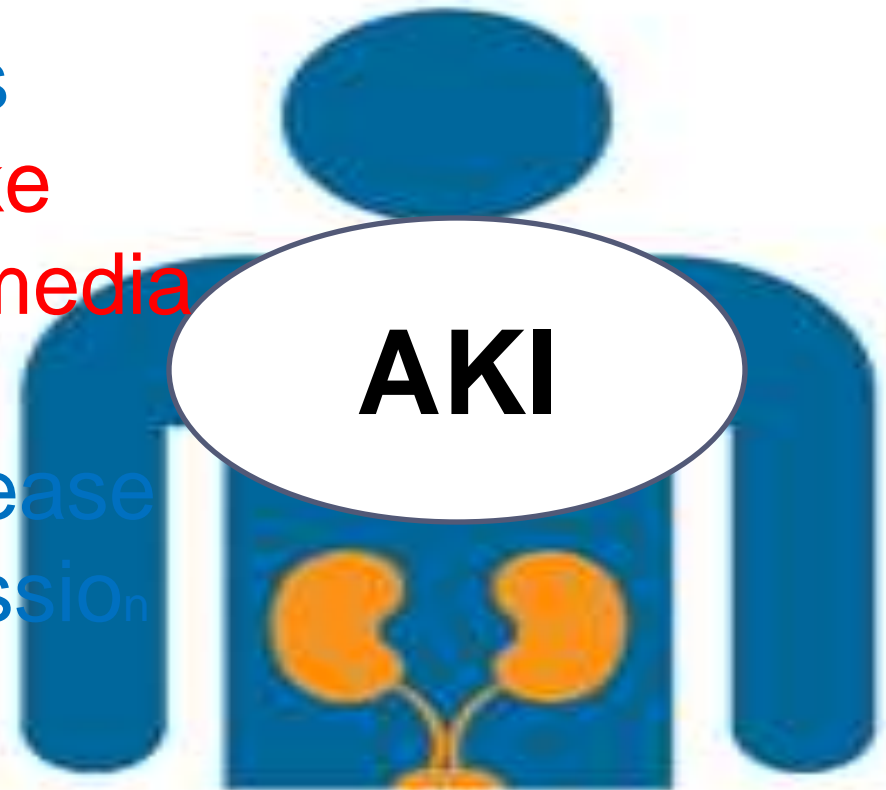
## Natural History of Type 1 Diabetic Nephropathy



- *If the decline in renal function exceptionally rapid*
- *If renal dysfunction is found without significant proteinuria (first, renovascular disease must be excluded)*

# Rapid decline in renal function

- Shock
- Hemolysis
- Drug intake
- Contrast media
- Infection
- Stone disease
- ICU admission



# Approach to Diabetic Patient with Impaired Renal Function

- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment
- Measurement of serum cr.& estimation of GFR
- Measurement of blood pressure

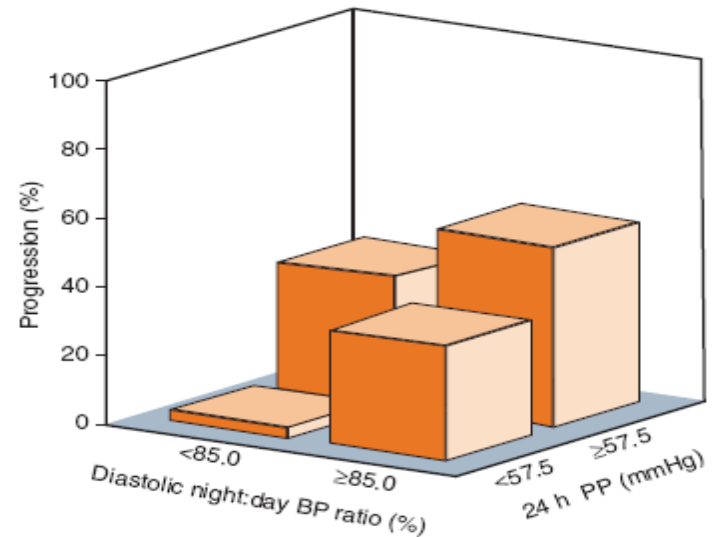


# Hypertension and Diabetic Nephropathy

## type 1 diabetes

- almost always caused by renal parenchymal disease.
- At present, however, type 1 diabetic patients survive longer, and a minority of elderly type 1 patients develop primary hypertension with no evidence of nephropathy

Proportion of Type 2 Diabetic Patients with Progression of Nephropathy According to Categories of Blood Pressure



**Ambulatory pulse pressure and impaired nocturnal BP decline are independent predictors of nephropathy progression in type 2 diabetic patients**

# Hypertension and Diabetic Nephropathy

Based on ultrasonographic examination and on renal biopsy finding, upto **20%** of Type 2 DM were shown to have ***ischemic nephropathy*** secondary to atherosclerotic renal artery disease or cholesterol microembolism.

# Ischemic nephropathy

- **Resistant hypertension**
- **Small sized kidneys**
- **Absence albuminuria**
- **Raised serum cr after ACEi**

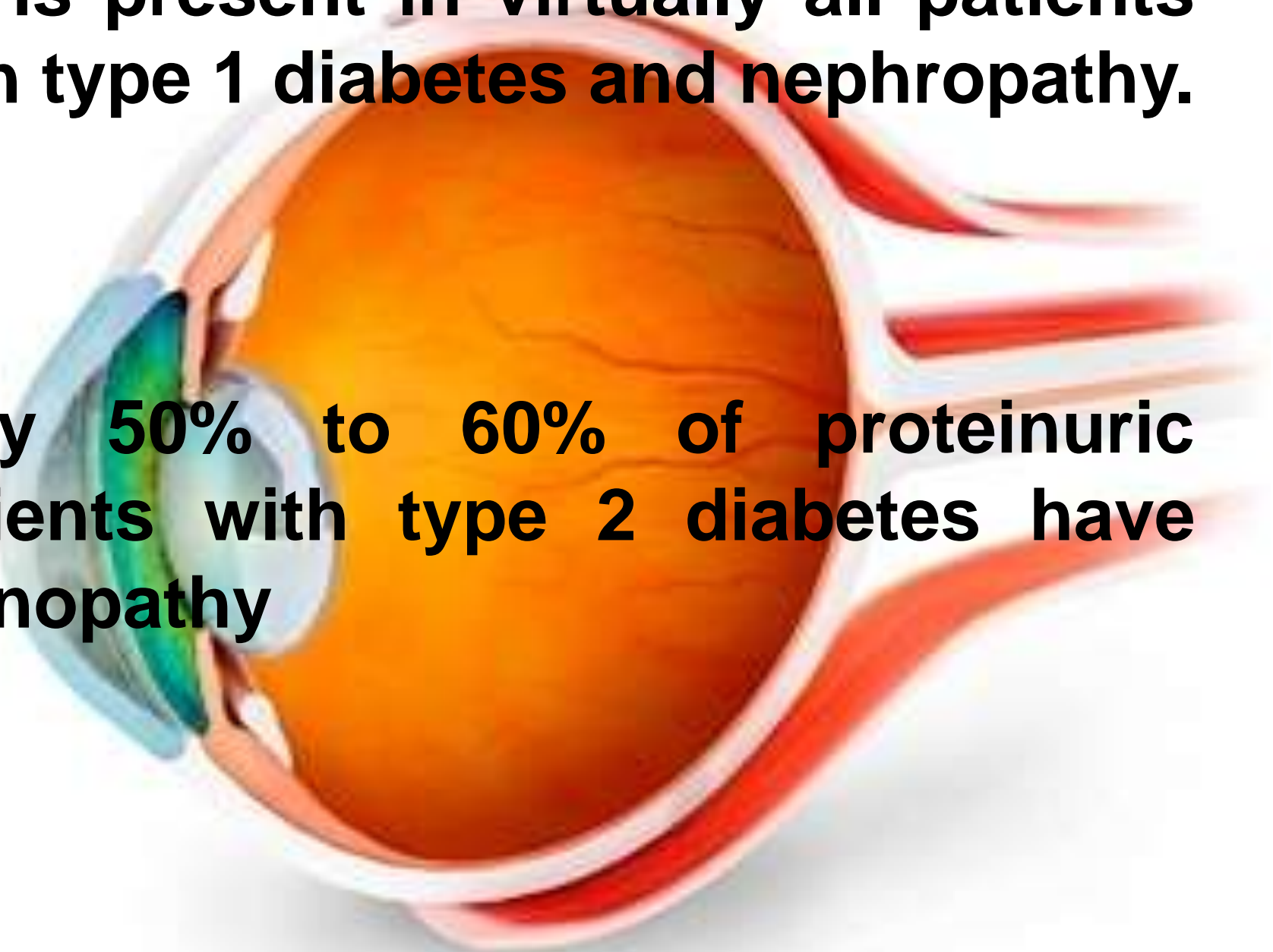


# Approach to Diabetic Patient with Impaired Renal Function

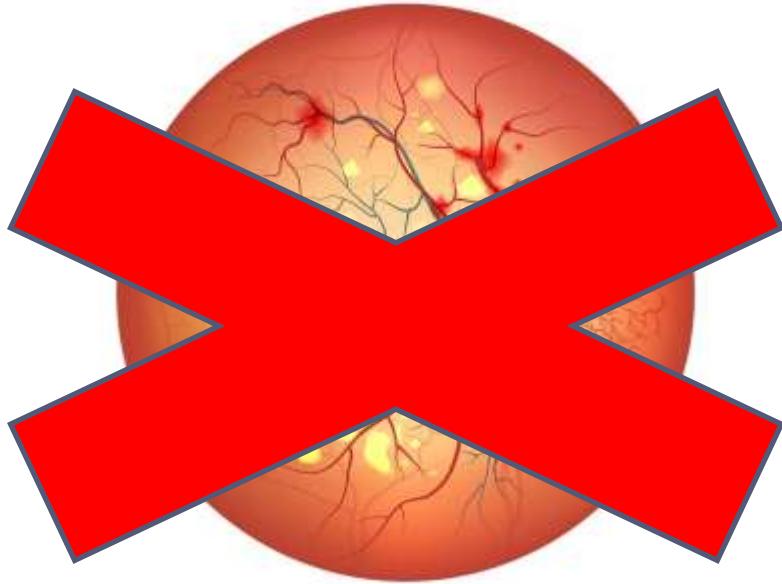
- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment
- Measurement of serum cr.& estimation of GFR
- Measurement of blood pressure
- Ophthalmologic examination

**DR is present in virtually all patients with type 1 diabetes and nephropathy.**

**Only 50% to 60% of proteinuric patients with type 2 diabetes have retinopathy**



# When to suspect NDRD



**in type 1DM**

**Absence of retinopathy does NOT exclude DN in type 2 DM**

# Non-diabetic renal disease in type 2 diabetes mellitus: Study of renal - retinal relationship

**J. Prakash, T. Gupta, S. Prakash<sup>1</sup>, P. Bhushan<sup>2</sup>, Usha<sup>3</sup>, M. Sivasankar, S. P. Singh<sup>4</sup>**

Departments of Nephrology, <sup>2</sup>Ophthalmology and <sup>3</sup>Pathology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, <sup>1</sup>Department of Medicine, TNMC, Mumbai, Maharashtra, <sup>4</sup>Department of Community Medicine, IMS, BHU, Varanasi, Uttar Pradesh, India



**Table 2: Renal retinal relationship in type 2 diabetic patients (*n*=31)**

<b>Historical lesions*</b>	<b>Group A (<i>n</i>=10) patients with diabetic retinopathy <i>n</i> (%)</b>	<b>Group B (<i>n</i>=21) patient without diabetic retinopathy <i>n</i> (%)</b>	<b>Fisher exact test <i>P</i></b>
NDRD	1 (10)	12 (57.14)	0.015
DN	6 (60)	6 (28.57)	0.100
Mixed lesion (NDRD+DN)	3 (30)	3 (14.29)	0.20

\*Pearson Chi-square test,  $\chi^2=6.18$ , *df*=2, *P*=0.045. NDRD: Non-diabetic renal disease, DN: Diabetic nephropathy

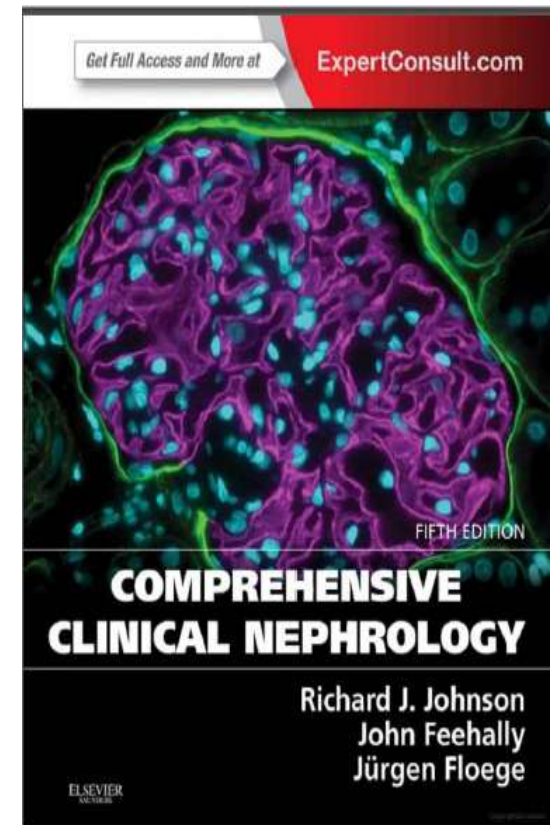
Absence of DR favors NDRD but does not exclude DN because isolated DN was noted in 28.57% cases in absence of DR.

# Approach to Diabetic Patient with Impaired Renal Function

- Type & duration of diabetes
- Assess natural history of progression of DN
- Measurement of urinary albumin or protein
- Search for urine sediment
- Measurement of serum cr.& estimation of GFR
- Measurement of blood pressure
- Ophthalmologic examination
- Search for evidence of the typical extrarenal microvascular and macrovascular complications of diabetes.
- Signs or symptoms of other systemic disease

# Indications for Renal Biopsy

- If retinopathy is not present in type 1 diabetes with proteinuria or moderately impaired renal function (absence of retinopathy does not exclude DN in type 2 diabetes).
- If the onset of proteinuria has been sudden and rapid, particularly in type 1 diabetes, and if the duration of type 1 diabetes has been less than 5 years. Alternatively, if the evolution has been atypical, for example, without transition through the usual stages, particularly the development of nephrotic syndrome without previous microalbuminuria.
- If macroscopic hematuria is present or active nephritic urinary sediment is found that suggests GN, such as acanthocytes and red blood cell casts; the sediment in DN typically is unremarkable apart from some occasional erythrocytes.
- If the decline in renal function is exceptionally rapid, or if renal dysfunction is found without significant proteinuria (first, renovascular disease must be excluded)



Review Article



## Non-Diabetic Renal Disease (NDRD) in Patients with Type 2 Diabetes Mellitus (Type 2 DM)

Jai Prakash\*

**Thus, these biopsy criteria are not useful in identifying patients with potentially treatable other renal lesions in Type 2 diabetic patients**





*World Journal of  
Diabetes*

Online Submissions: [http://www.wjgnet.com/esps/  
bpgoffice@wjgnet.com](http://www.wjgnet.com/esps/bpgoffice@wjgnet.com)  
doi:10.4239/wjd.v4.i6.245

*World J Diabetes* 2013 December 15; 4(6): 245-255  
ISSN 1948-9358 (online)

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*REVIEW*

## **Diabetic nephropathy: Is it time yet for routine kidney biopsy?**

Maria L Gonzalez Suarez, David B Thomas, Laura Barisoni, Alessia Fornoni



# Comparison of diabetic nephropathy and non-diabetic renal disease prevalence reported in the literature

**Table 2** Comparison of diabetic nephropathy and non-diabetic renal disease prevalence reported in the literature

Ref.	Country	Population	Type 1 or 2 DM	% DN	% NDRD	% Mixed
Mazzucco <i>et al</i> <sup>[22]</sup>	Italy	393	2	39.7	43	17.3
Christensen <i>et al</i> <sup>[23]</sup>	Denmark	51	2	68.6	13.8	NR
Zhang <i>et al</i> <sup>[24]</sup>	China	130	2	73.9	26.1	NR
Zhuo <i>et al</i> <sup>[25]</sup>	China/Japan	216	2	6.5	82.9	10.7
Sharma <i>et al</i> <sup>[26]</sup>	United States	620	2	37	36	27
Hironaka <i>et al</i> <sup>[27]</sup>	Japan	35	1 and 2	71.4	14.3	14.3
Wong <i>et al</i> <sup>[28]</sup>	China	68	2	35	46	19
Prakash <i>et al</i> <sup>[29]</sup>	India	23	2	56.5	30.5	13
Mak <i>et al</i> <sup>[30]</sup>	China	51	2	67	16	17
Biensebach <i>et al</i> <sup>[31]</sup>	Austria	84	2	78.5	21.5	NR
Richards <i>et al</i> <sup>[32]</sup>	United Kingdom	68	1 and 2	61	32	3
Parving <i>et al</i> <sup>[33]</sup>	Denmark	35	2	77.1	20	2.9
Cordonnier <i>et al</i> <sup>[34]</sup>	United Kingdom	26	2	85	15	NR
Næstve <i>et al</i> <sup>[35]</sup>	United States	31	2	41.9	19.4	38.7
Lee <i>et al</i> <sup>[36]</sup>	South Korea	22	2	36.4	50	13.6
Lezandine <i>et al</i> <sup>[37]</sup>	France	21	1 and 2	62	38	NR
Castellano <i>et al</i> <sup>[38]</sup>	Spain	20	2	45	55	NR
Serra <i>et al</i> <sup>[39]</sup>	Spain	35	2	74.3	17.2	8.5
Premalatha <i>et al</i> <sup>[40]</sup>	India	18	2	50	50	NR
Rychlik <i>et al</i> <sup>[41]</sup>	Czech Republic	163	2	42.4	47.5	10.1
Tone <i>et al</i> <sup>[42]</sup>	Japan	97	2	36	16.5	47.5
Moger <i>et al</i> <sup>[43]</sup>	India	26	2	34.6	23.1	42.3
Soni <i>et al</i> <sup>[44]</sup>	India	160	2	42.5	27.5	30
Pham <i>et al</i> <sup>[45]</sup>	United States	233	2	27.5	53.2	19.3
Kharrai <i>et al</i> <sup>[46]</sup>	Tunisia	72	2	34.1	69.5	NR
Akimoto <i>et al</i> <sup>[47]</sup>	Japan	50	2	68	26	6
Huang <i>et al</i> <sup>[48]</sup>	China	52	2	55.7	38.5	5.8
Lin <i>et al</i> <sup>[49]</sup>	Taiwan, China	50	2	48	22	30
Ghani <i>et al</i> <sup>[50]</sup>	Kuwait	31	2	54.8	NR	45.2
Arif <i>et al</i> <sup>[51]</sup>	Pakistan	73	2	27.3	49.3	NR
Hashim Al-Saedi <i>et al</i> <sup>[52]</sup>	Iraq	80	1 and 2	NR	NR	100
Mou <i>et al</i> <sup>[53]</sup>	China	69	2	47.8	52.2	NR
Haider <i>et al</i> <sup>[54]</sup>	Austria	567	1 and 2	68	17.4	NR
Chang <i>et al</i> <sup>[55]</sup>	South Korea	119	2	36.2	53.8	10
Bi <i>et al</i> <sup>[56]</sup>	China	220	2	54.5	NR	45.5
Chong <i>et al</i> <sup>[57]</sup>	Malaysia	110	2	62.7	18.2	19.1
Harada <i>et al</i> <sup>[58]</sup>	Japan	55	2	54.5	34.5	10.9
Oh <i>et al</i> <sup>[59]</sup>	South Korea	126	2	39.7	51.6	8.7
Yaqub <i>et al</i> <sup>[60]</sup>	Pakistan	68	2	31	52	17

Reported NDRD varies in the literature from a range of 14%-82.9%



## Diabetic nephropathy: Is it time yet for routine kidney biopsy?

Maria L Gonzalez Suarez, David B Thomas, Laura Barisoni, Alessia Fornoni

**Core tip:** Diagnostic tests are useful to predict onset, progression and response to therapeutic interventions in diabetic nephropathy (DN). Renal biopsies help to classify renal diseases in three major groups associated with different prognostic features: diabetic nephropathy, non-diabetic nephropathy (NDRD), and a superimposed non-diabetic condition on underlying DN. Pathological renal damage is hard to predict only with clinical and laboratory findings. In patients with a higher degree of suspicion for NDRD, it is granted the need of a renal biopsy. For this reason, more studies are required to assess the routine use of kidney biopsies as a gold standard for diagnosis of diabetic nephropathy.

## Predicting non-diabetic renal disease in type 2 diabetic adults: The value of glycated hemoglobin.

Pallayova M<sup>1</sup>, Mohammed A<sup>2</sup>, Langman G<sup>3</sup>, Taheri S<sup>4</sup>, Dasgupta I<sup>5</sup>.

### Author information

#### Abstract

**AIMS:** The indications for renal biopsy in type 2 diabetes mellitus (T2D) are not well established. We investigated the prevalence, spectrum, and predictors of biopsy-proven non-diabetic renal disease (NDRD) in T2D.

**METHODS:** An observational, single-center, retrospective study of T2D adults who underwent renal biopsies (N = 51) over 10 years for nephrotic-range proteinuria, microscopic hematuria, or rapidly declining renal function.

**RESULTS:** Thirty-five (68.6%) biopsies were diagnostic of NDRD, and 16 (31.4%) revealed isolated diabetic nephropathy. The most common NDRDs were interstitial nephritis (20%), progressive crescentic glomerulonephritis (14%), membranous nephropathy (11%), and focal segmental glomerulosclerosis (11%). The odds for NDRD declined by 97% in the presence of diabetic retinopathy ( $P < 0.001$ ). The deterioration of HbA1c during the year before biopsy predicted NDRD even after adjusting for diabetic retinopathy (OR, 7.65; 95% CI, 1.36-123.04;  $P = 0.003$ ). A model based on the interaction between the HbA1c values 12 months before biopsy and the absolute change in these values during the preceding year predicted NDRD with 73.7% sensitivity and 75% specificity (AUC, 0.77; 95% CI, 0.59-0.94).

**CONCLUSIONS:** This study demonstrated a considerably high prevalence of NDRD in T2D adults undergoing renal biopsy. The absence of diabetic retinopathy, lower HbA1c values 12 months before biopsy and greater deterioration in HbA1c prior to biopsy predicted NDRD in T2D. Further studies are needed to validate the findings.

**Conclusion**

# Diagnosis of Diabetic Kidney Disease

- Type & duration of diabetes
- Assess natural history of progression of DN
- Acute vs chronic kidney ds

- Measurement of blood pressure

- Search for evidence of the typical extrarenal microvascular an macrovascular complications of diabetes.
- Signs or symptoms of other systemic disease

# Diagnosis of Diabetic Kidney Disease

- **Ophthalmologic examination**
- **Renal us**

- **Measurement of urinary albumin or protein**
- **Search for urine sediment**
- **Measurement of serum cr.& estimation of GFR**



Factors Favouring Classical Diabetic Nephropathy vs. Alternate Diagnoses (17-20)	
Favours Diabetic Nephropathy	Favours Alternate Renal Diagnosis
Persistent albuminuria	Extreme proteinuria (>6 g/d)
Bland urine sediment	Persistent hematuria (micro- or macroscopic) or active urinary sediment
Slow progression of disease	Rapidly falling eGFR
Low eGFR associated with overt proteinuria	Low eGFR with little or no proteinuria
Other complications of diabetes present	Other complications of diabetes not present or relatively not as severe
Known duration of DM >5 years	Known duration of diabetes <5 years
	Family history or nondiabetic renal disease (e.g. polycystic kidney disease)
	Signs or symptoms of systemic disease

# Clinical Evaluation of Diabetic Nephropathy

Important  
Message

Diabetes proteinuria

Exclude urinary tract infection  
Urine microscopy: red cells, white cell casts?  
Quantitate proteinuria  
Renal ultrasonography  
Serology if glomerulonephritis suspected  
ANCA, DNA antibodies, C3, C4

**Typical diabetic nephropathy**  
Type 1 diabetes for >10 years  
Retinopathy  
Previous microalbuminuria  
No macroscopic hematuria  
No red cell casts  
Enlarged kidneys on ultrasound

No renal biopsy

**Atypical proteinuria**  
Type 1 diabetes for <10 years  
No retinopathy  
Nephrotic-range proteinuria  
without progression through  
microalbuminuria  
Macroscopic hematuria  
Red cell casts

Renal biopsy

**Atypical**  
Azotemia with proteinuria <1 g/day  
Papillary necrosis (pyuria,  
hematuria, scarring)  
Tuberculosis (pyuria, hematuria)  
Renovascular disease (other  
occlusive vascular disease)

No renal biopsy





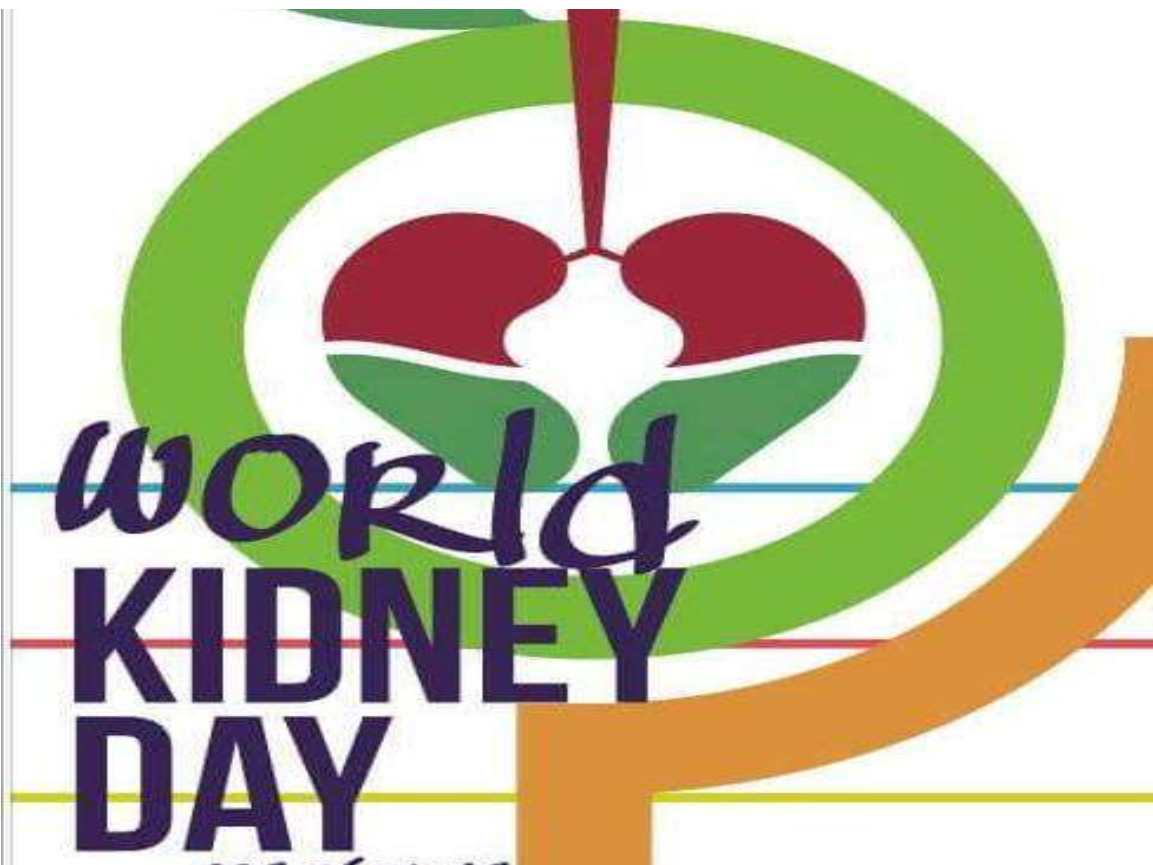
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### Kidney disease and children: Raising awareness & building hope

Posted Mon Feb 22nd 2016

**Mansoura faculty of Medicine** in collaboration with all its renal units will celebrate the world kidney day by two activities in March 2016. In the first three weeks of march, school children will be screened for renal disease through parallel visits by professional medical



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